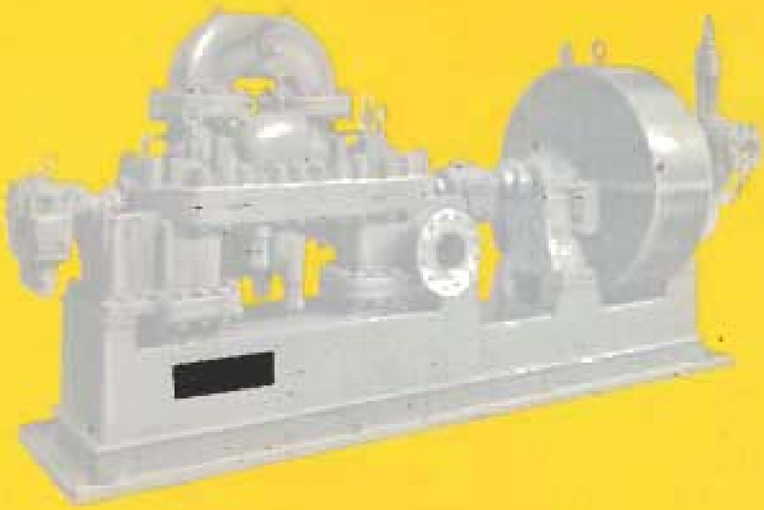
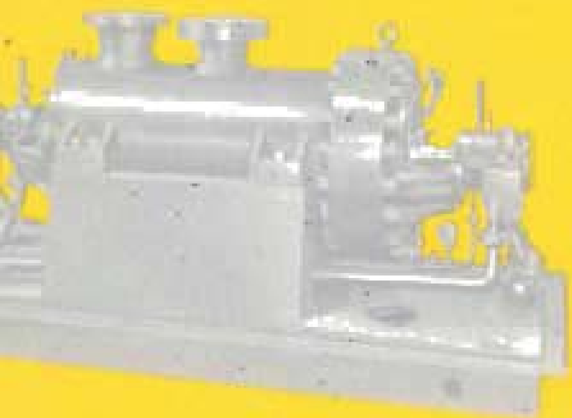
KINGSBURY
Six-Shoe
Thrust Bearings
and
Journal Bearings
Pump Types
Horizontal

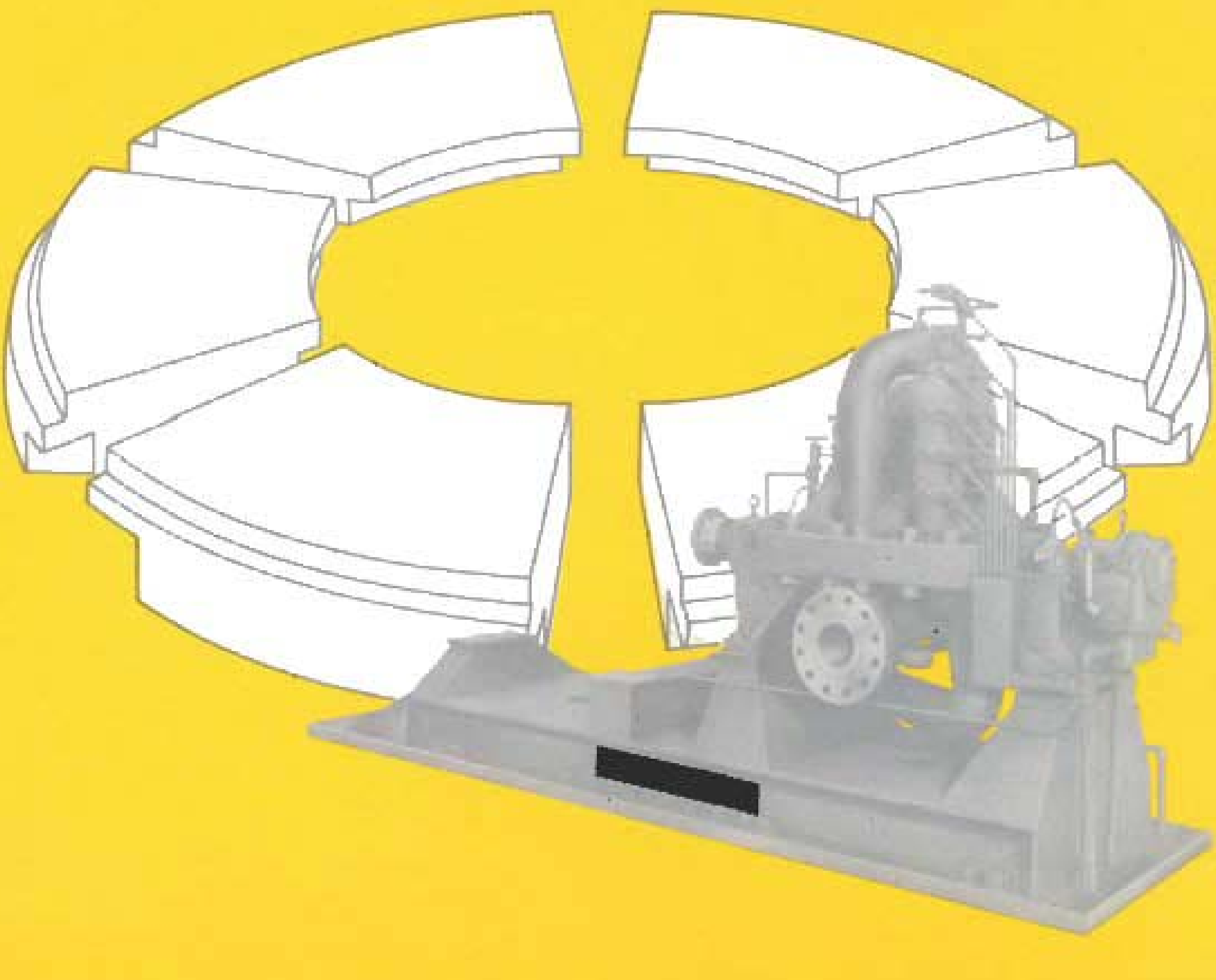
DIMENSIONS AND CAPACITIES

Catalog CP

KINGSBURY







KINGSBURY

SIX-SHOE THRUST BEARINGS

AND

JOURNAL BEARINGS

Pump Types, Horizontal

DIMENSIONS

and

CAPACITIES

CATALOG CP

KINGSBURY

KINGSBURY MACHINE WORKS, INC.

PHILADELPHIA, PENNA.

Printed in U.S.A.
October, 1966

CONTENTS

FOREWORD

This Catalog is devoted to dimension and capacity tables of horizontal pump thrust bearings, Style CH, and separate inboard journal bearings, Style C. These styles are now supplied for applications in which Styles SH and S were formerly furnished. SH and S are now obsolete and are no longer furnished.

Standard sizes run from 4 inches to 9 inches; the "size" is the outside diameter of the thrust shoe bearing faces. (The outside diameter of the collar is slightly larger.) They cover all usual horizontal applications for boiler feed pumps, condenser circulating, hot oil pumps and similar purposes. Thrust capacities run to about 15,000 lbs. Special sizes of bearings can be built if conditions warrant.

These standard bearings are self-contained and independent of external oiling systems. However, the oil and cooling requirements may vary widely according to the running speed, etc; hence the bearings are made adaptable to a variety of operating conditions, as shown on pages 12 to 14. Style C journal bearings are oiled by pipe connections from and to the thrust bearings.

Since this Catalog deals only with designs already developed—including several variations in size of attachment flange—changes to meet particular requirements are not represented here. We are always glad to discuss special needs.

Because of possible minor changes, the dimensions in the tables should be confirmed by a certified print before being used for actual construction.

Although the six-shoe elements used in CH bearings are in most respects similar to standard JHJ bearings, elsewhere cataloged, replacement orders should always specify that the parts are intended for the CH bearing of size listed.

The Kingsbury Principle

The Kingsbury principle is illustrated in Figure 1 as it would apply with a vertical shaft. A *thrust collar* attached to a shaft (not shown) in a bath of oil bears against a number of segmental "*shoes*," each of which is pivoted and free to tilt. Oil adhering to the collar is drawn in at the entering edges of the shoes. Since the shoes can tilt, the films are slightly thicker at the entering edges. This wedge-shaped feature permits continuous self-renewal of the films; consequently a Kingsbury thrust bearing carries much heavier loads than would be possible with parallel surfaces.

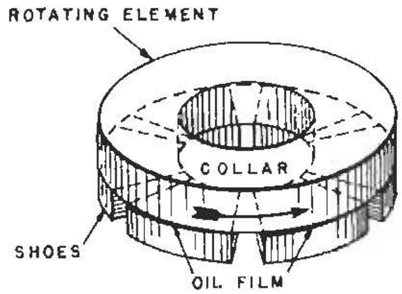


Figure 1

Rotating thrust collar, supported by pivoted shoes. (Oil bath is assumed.)

Basic Kingsbury Elements

The basic elements of six-shoe thrust bearings for horizontal shafts, are:

(1) The stationary pivoted shoes.

(2) The thrust collar which rotates with the shaft, and applies the load to the shoes.

(3) The leveling plates, arranged as in Figure 2, which cause all the shoes to bear substantially equal loads.

(4) The base rings which support the leveling plates and shoes shown in Figures 2 and 3. They are usually split for convenient handling without lifting the shaft.

(5) The housing which contains all the bearing parts and furnishes the necessary reservoir space to hold the oil supply for the thrust and journal bearings.

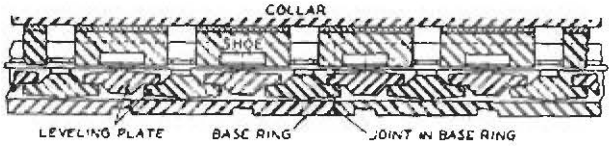


Figure 2

Developed diagram showing principle of equalized support of shoes by use of leveling plates.

(6) The oil circulator which continuously pumps oil to the thrust and journal bearings.

(7) The oil cooler, usually of the plate-type, bolted directly to the housing base, receiving the heated oil from the bearing discharge and returning it, cooled, to the reservoir.

Every installation of thrust bearings of the type under discussion involves these elements with such modifications as are indicated in the illustrations.

Figure 3 shows the complete assembly of elements for one side of a bearing while Figure 4 shows the elements for both sides, including the collar.

Figure 3

Split base ring and leveling plates of small six-shoe bearing. A "lower" leveling plate is shown separately.

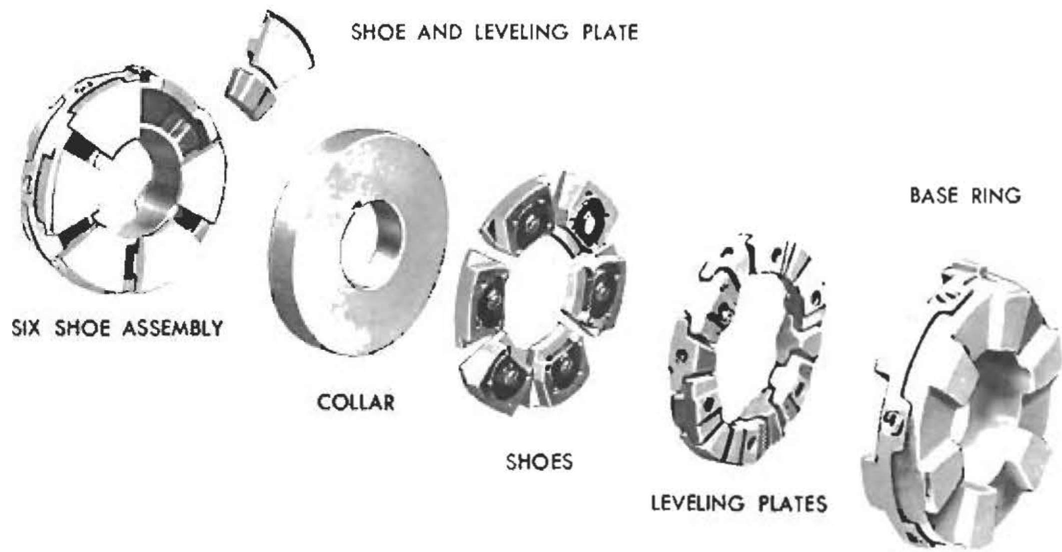


Figure 4

Small double (two-way) six-shoe thrust bearing. Near side elements "exploded." Far side elements assembled.

Style CH Bearings

In Style CH bearings, the basic thrust elements described above are built into a housing which contains also a *journal bearing* and an *oil circulator*, by which oil is drawn from the bottom of the housing and circulated rapidly between the shoes and around the collar. Provision is also made, by an attached cooler or otherwise, for carrying off the heat generated by oil shear under the sometimes high unit loads, and the high speeds, at which these bearings usually run.

Figure 5 shows a Style CH bearing assembled. Figure 6 shows the same bearing with the housing cover lifted, exposing the internal parts.

The standard CH bearings are arranged as shown in Figure 8. By removing a screw plug in the end cover, a tachometer stem may be inserted.

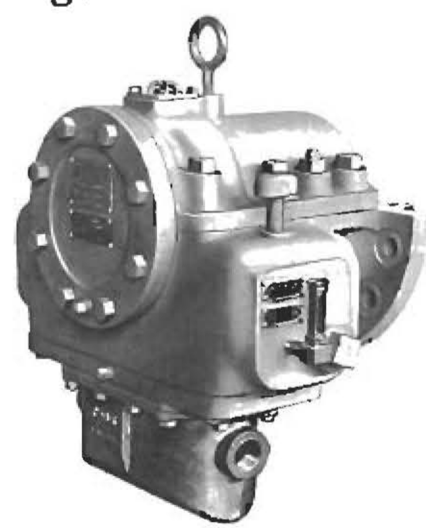


Figure 5

Standard style CH thrust bearing with built-in journal bearing, fully assembled.

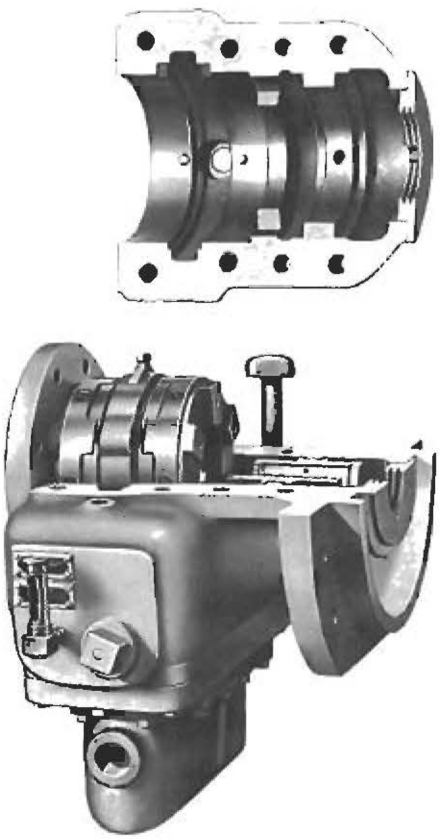


Figure 6

Standard style CH thrust bearing with built-in journal bearing and attached cooler, housing cap removed. Oil circulator surrounds thrust collar.

The Oil Circulator

Since these bearings usually run heavily loaded, the shearing of the oil films generates heat which must be removed by rapid circulation and cooling of the oil. Oil from the reservoir is drawn into a bronze ring, called the "*circulator*," surrounding the collar, and is carried by adhesion to the collar around a shallow groove in the ring. At the end of its travel, it meets a dam in the groove and is pushed by the oil behind it into ports leading to spaces between the lowest shoes on both sides. Shaft rotation carries it to the other shoes, and it finally escapes, above the collar, into a passage leading down to the cooler. From the cooler it returns to the reservoir.

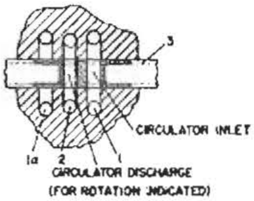
Besides the ports just mentioned, there is another set so arranged that the oil will circulate even with reverse rotation of the collar. For this purpose, advantage is taken of the adhesiveness of the oil, which (when the direction of rotation is changed) carries the circulator with it for a short angle, until the lug at the top of the circulator meets a stop. In either of the two "stop" positions, oil enters the groove in the circulator by the proper ports for the prevailing direction of rotation, and is discharged through other ports into the spaces between the lower shoes. Details are shown in Figures 7 and 8 and in Figures 16 and 17 on page 15.

Figure 7

Oil circulator as used in type CH thrust bearings.

Built-in Journal Bearing

The built-in journal bearing which forms a part of the standard CH design is self-aligning, and is lubricated in such a manner as to take fullest advantage of the load-bearing capacity of the oil film. Thus designed, experience has shown that even short journal shells run with unbroken films under the severest radial loads imposed by the pump runner.



Developed
Section AA

Part section showing oil circulation ports in bottom of oil circulator. With ring in position shown ports 1 serve as the intake. With rotation reversed, ports 1a serve as the intake. In either case, port 2 is the discharge.

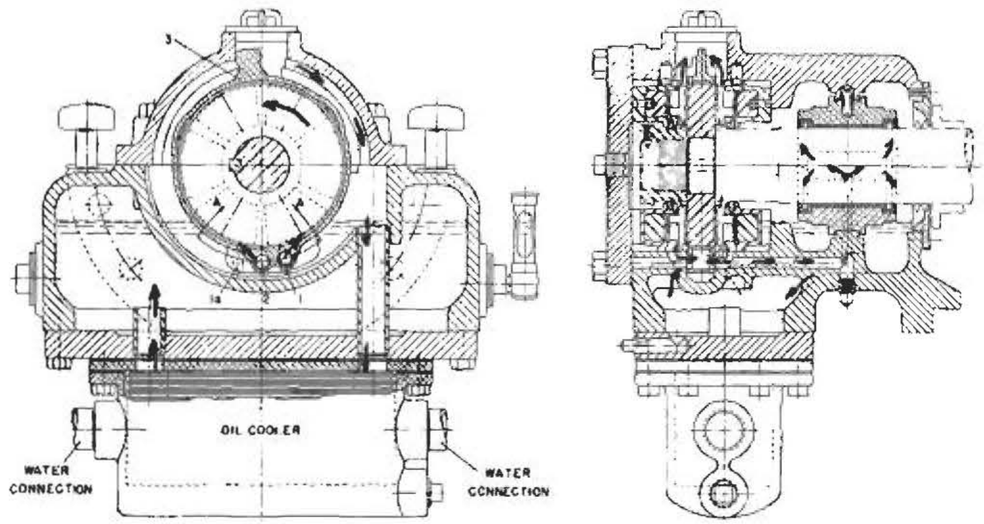


Figure 8

Longitudinal and transverse sections through a standard type CH bearing with part section indicating oil intakes and discharge from oil circulator.

Inboard Journal Bearing

For customers wishing to use the same journal bearing design at the inboard end, between the pump and the drive, we can provide for oil circulation to the inboard bearing from the thrust bearing. These separate journal bearings, called Style C, are duplicates of the Style CH built-in bearing, and the bearing shells are interchangeable . . . Oil is received under some pressure, which is generated by the circulator. It returns under no pressure through a larger pipe, which is arranged as shown in Figure 9.

Replacements for Style SH

Style CH bearings are substantially shorter than the older Style SH bearings, which they may be used to replace. Customers wishing to replace Style SH bearings with the newer CH should have the pump shafts shortened to the CH standards.

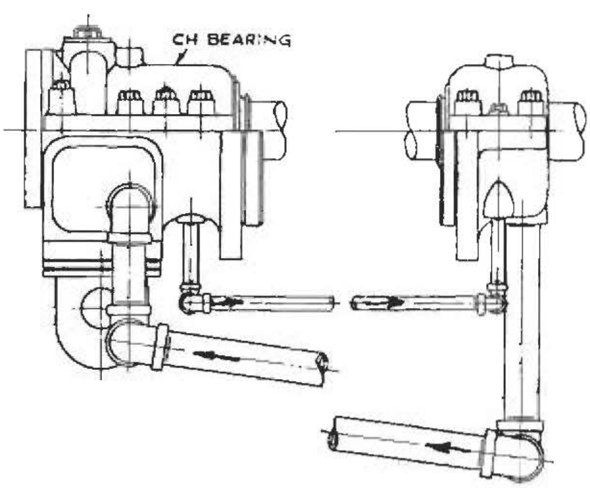


Figure 9

Diagram showing preferred method of piping where a separate journal bearing is lubricated from a type CH bearing.

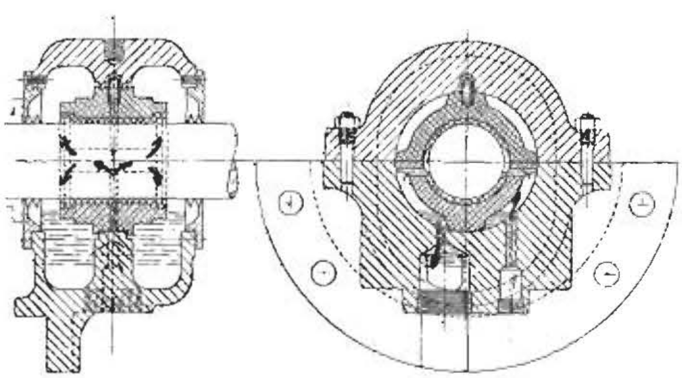


Figure 10

Sectional views through a standard type C journal bearing.

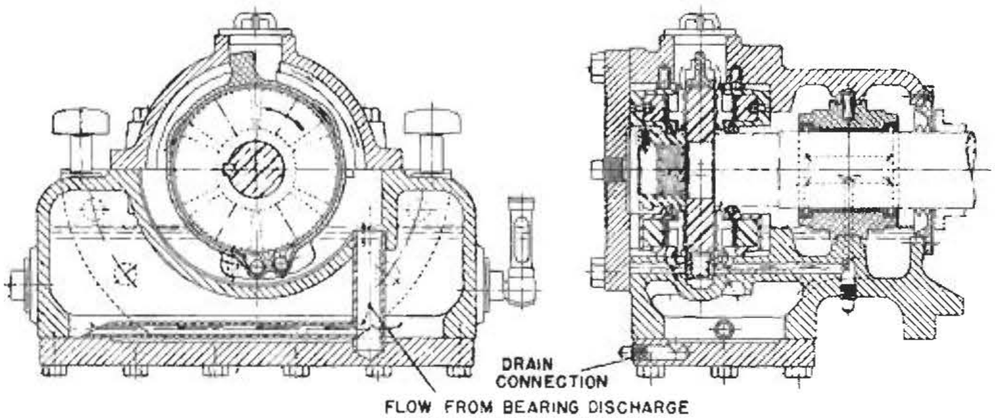


Figure 11

Standard type CH bearing arranged without cooler.

Cooling and Cooler

Most users prefer that pump bearing lubrication be independent of lubrication of other machinery. Accordingly, standard CH bearings include an oil cooler to carry off the heat due to oil shear.

For usual operating conditions, the Harrison Plate-Type Cooler, shown in the illustrations Figures 5, 6 and 8, is standard equipment. It is compact, efficient, and easily dismounted when cleaning becomes necessary. Several sizes are available to suit requirements.

By suitably adapting the bottom cover plate, between the thrust bearing housing and the cooler, it is possible to use either of two, or sometimes three, sizes of cooler with most sizes of thrust bearing. We should be consulted regarding the size cooler to be used for any specific application.

Air Cooling

Table I shows the speeds for which air cooling is permissible. Dimensions *M* in Table IV are correct for air-cooled bearings, simply by omitting the Harrison Cooler.

Special Cooling Arrangements

For low speeds the cooler may be omitted, as shown in Figure 11. It is, however, still necessary to circulate the oil internally by means of the oil circulator surrounding the collar.

If it is desired to extend the shaft through the cover, the cover can be arranged as shown in Figure 13. (The circulator must still be used.)

High running speeds, such as may be encountered in certain applications, require the thrust bearing to be equipped with an outside cooler of sufficient capacity. For this purpose a tubular cooler is commonly mounted on a bracket attached to the turbine housing or bedplate, as indicated in Figure 12.

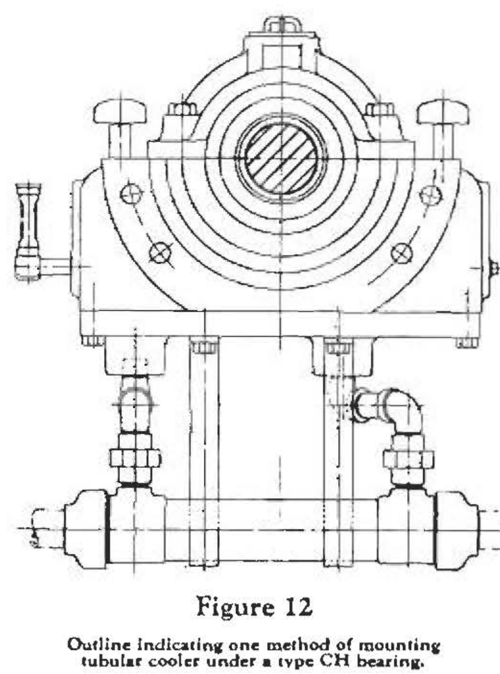


Figure 12

Outline indicating one method of mounting tubular cooler under a type CH bearing.

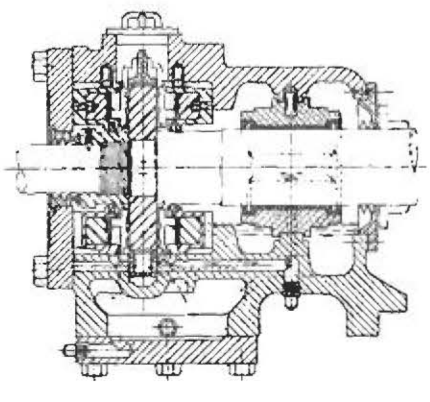


Figure 13

Section of CH bearing with shaft extension for connection to external auxiliary apparatus.

If the oil circulator in the thrust bearing is used also to circulate oil to and from the inboard journal bearing, the return pipe must be of generous diameter because of the very slight head. The pipe should be arranged as shown in Figure 9, with the return pipe going approximately straight down far enough to give a continuous rise from the lowest point to the thrust bearing. Arranged thus, any air bubbles will be vented either at the journal bearing or at the thrust bearing.

All oil piping must be carried well below the oil level.

It is important to make sure that the oil cannot become thick from cold when standing. If very viscous, or congealed, it must be warmed to thin it before a start is made.

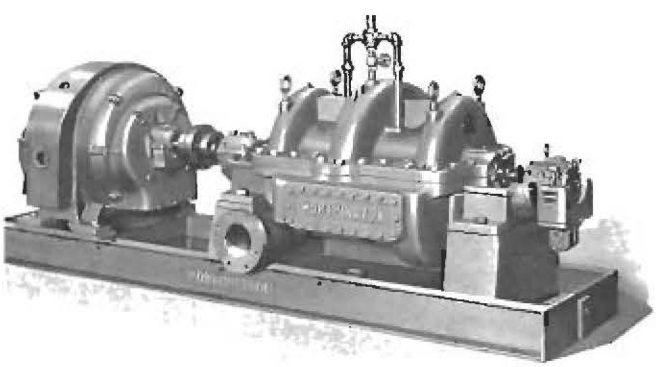


Figure 14

Photograph of a typical motor-driven condensate pump fitted with type CH thrust and journal bearings. *Courtesy the Worthington Corporation.*

TABLE I

MAXIMUM SPEEDS FOR AIR-COOLED OPERATION

Style CH Thrust Bearings
Style C Journal Bearings
(Oil Coolers omitted)

BEARING NUMBER	MAXIMUM R.P.M.
4	850
5	575
6	500
7	450
8	400
9	360

Assumptions:

1. Thrust loads do not exceed rated values. See Table II.
2. Surrounding air can pass freely over walls of mounting.
3. Temperature of surrounding air not exceeding 80° to 90° F.
4. Viscosity of oil about 400 S.U.V. at 100° F.

Notes:

Oil coolers are omitted in style CH thrust units, for air-cooled operation.

Separate journal bearings have likewise adequate air cooling capacity at above speeds.

For more severe conditions oil heavier than 400 S.U.V. would be required.

Notes on Tables

Standard Bearing Sizes

The standard CH bearings listed on pages 13 and 16 are those which we have found most in demand. Variations concern chiefly the radius of the attachment flange. Several alternative flange sizes are listed. Others can be supplied on special order subject to longer delivery.

The 4-inch Style CH thrust bearings have four shoes each side of the thrust collar, instead of the usual six shoes. There are two standard 4-inch designs. One design, called "Regular," conforms in general characteristics to the 5-inch and larger sizes. The other CH–4 (commonly called the "Short" bearing) is appreciably shorter. Its one-piece journal bearing shell, though self-aligning, is different in form and differently mounted, and the arrangement of oil seal rings is also different.

Optional Flanges

Certain alternative diameters *FF* of attachment flange are offered. These are listed in Table V. In that Table the special dimensions are indicated by *bold-face* type. The other dimensions agree with the standards for the same bearing sizes.

In standard housings, the bottom of the attachment flange is cut flat on the same level as the bottom of the reservoir. When oversized special flanges are used, a separate segment, completing the half-circle of the flange, is sometimes added for the sake of appearance. It is attached to the pump body by bolts matching those of the main flange, and has no structural function.

Optional Shaft Diameters

The shaft dimensions given in Tables IV and V are the standard for normal applications. If the shaft sizes shown are not adequate for your specific requirements, optional diameters are available, as shown in Table VII, for the journal and for the shaft size between the journal and the collar. This applies to both standard and special-flange bearings. The collar bores B are standard and should not be changed if that can be avoided. This requires a sufficient shoulder for the collar, which in turn fixes the minimum diameter AA. If that diameter AA is too large to be acceptable, then diameters AS and BS respectively may be used as special.

Dimension Z between the collar and the nearest shoulder is required to accommodate the seal ring shown in the assembly drawings, Figures 8, 11 and 13 and also in Figures 16 and 17.

Load Ratings

The rated loads are based on a viscosity of 150 Saybolt Seconds at the actual temperature prevailing in operation. This corresponds to about 250 Saybolt Seconds at 100 degrees F., and that viscosity is suitable for the running speed (3600 r.p.m.) of most boiler feed pumps.

For lower speeds, somewhat higher viscosity and loads are permissible. Higher speeds call for lighter oil, and usually for somewhat lighter loads. We should be consulted if unusual loads or speeds are intended.

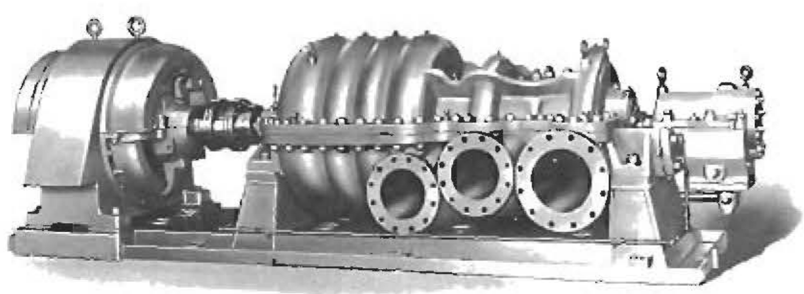


Figure 15

View of motor-driven Multi-section Condensate and Booster pump with type CH thrust and journal bearing.
Courtesy Foster-Wheeler Corp.

Use of Tables to Select Bearing Size

The nominal bearing size is designated by the thrust collar diameter.

Usually the desired journal diameter and thrust load are known. Table VII shows the available size (or sizes) of thrust collar for a journal bearing of given diameter. Consult Table II for the thrust capacities of those sizes, remembering that the table ratings are based on oil of 250 SUV at 100 degrees F., and that the actual capacity may be increased or lowered by changing the viscosity. If the load is light, a somewhat lighter oil should be used. Note also that the table ratings refer to the standard six shoes.

For each thrust bearing size, the second and third journal diameters in Table VII are the most conveniently used. They are indicated as *AA* and *I* in Table VII. The smallest size requires a sub-standard collar bore. The larger sizes require the shaft to be stepped down to suit the collar.

If the collar must be integral, note the maximum diameter AS given in the table for the shaft diameter next to the collar. Exceeding that diameter would require the shoes to be bored larger than standard, which would reduce the thrust capacity of the mounting.

For whatever oil viscosity is favored for the thrust bearing, find the corresponding journal bearing capacity in Table III by using the conversion factors for different viscosities. The oil ultimately selected should be adequate for both thrust and journal bearings.

Under special conditions it may be advisable to increase the oil viscosity, e. g., a pump handling hot liquids might communicate to the thrust bearing a temperature high enough to require use of a heavier oil. Again, the design of the pump body, or the size of the shaft, might make it convenient to use a thrust bearing a size larger than the minimum indicated by the load.

For other data required when ordering Kingsbury Thrust Bearings and Mountings, see page 20.

Style CH Thrust Bearings Rated Thrust Capacities

Sizes 4 to 9 inches
(In Pounds)

TABLE II

Size	Shoe Area	REVOLUTIONS PER MINUTE							
		200	400	600	1200	1800	2400	3600	4500
4	6.2	850	1050	1100	1350	1500	1600	1750	1870
5	12.5	1700	2000	2200	2650	2900	3200	3500	
6	18.0	2650	3200	3500	4250	4600	4900	5500	
7	24.5	3900	4700	5150	6250	6700	7300	8200	
8	32	5500	6500	7200	8600	9500	10300	11000	
9	40.5	7500	9000	9600	11500	12500	13800	15000	

Figures are based on the use of an oil of 250 Saybolt seconds at 100 degrees F. and on the assumption that adequate cooling is provided. The CH-4 Bearing has four shoes; all other sizes have six shoes.

For other oils use the following conversion factors:

Viscosity SUV at 100 degrees F.	100	150	200	250	300	350	400	450	500	550	600
Conversion Factor	.5	.65	.85	1	1.15	1.35	1.50	1.70	1.85	2.05	2.20

Example

Proposition

Primary data: Thrust load 8000 lbs., shaft diameter at journal 3¼ in. Speed 3600 rpm. Type of mounting, standard "Half-End-Flange" as in Figure 8. Journal bearing load, 2200 lbs.

Solution

Table II shows the thrust capacity of a 7 in. six-shoe bearing to be 8200 lbs. at 3600 rpm, using oil of 250 SUV at 100 degrees F. Table III shows the radial load capacity of a 3¼ x 3½ in. journal, using the same oil, to be 2760 lbs. at 3600 rpm. A 7 in. bearing will therefore meet both conditions.

Journal Bearing Capacities: Sizes 4 to 9 inches

(In Pounds)

TABLE III

Bearing Size	JOURNAL		REVOLUTIONS PER MINUTE									
	Diameter	Net Length	50	100	200	400	600	1200	1800	2400	3600	4500
4	1½	1¾	75	90	110	165	205	290	340	390	450	490
	1⅝		80	95	120	175	215	310	370	420	490	530
	1¾		85	100	125	185	225	330	390	440	520	560
5	2	2½	190	220	270	400	490	700	820	930	1080	
	2¼		220	250	300	440	540	760	880	1000	1170	
	2½		240	270	320	480	580	810	960	1080	1250	
	2¾		250	280	340	500	620	850	1010	1130	1300	
6	2½	3	340	380	460	670	820	1150	1370	1530	1770	
	2¾		360	410	490	720	890	1230	1470	1630	1880	
	3		380	430	520	770	940	1300	1540	1700	1960	
	3¼		400	450	540	810	980	1340	1600	1770	2030	
7	3	3½	520	580	700	1040	1270	1750	2080	2300	2640	
	3¼		550	610	740	1100	1330	1830	2180	2410	2760	
	3½		580	640	780	1150	1420	1930	2300	2530	2880	
	3¾		610	670	830	1220	1520	2030	2400	2670	3030	
8	3½	4	760	830	1010	1500	1850	2510	3000	3290	3750	
	3¾		800	870	1080	1590	1980	2650	3140	3480	3960	
	4		810	890	1100	1620	2020	2700	3220	3550	4050	
	4¼		840	930	1160	1710	2120	2810	3370	3700	4190	
9	4	4½	1020	1120	1370	2040	2540	3400	4060	4470	5100	
	4¼		1090	1190	1470	2180	2710	3600	4310	4730	5360	
	4½		1100	1200	1480	2190	2720	3650	4370	4750	5400	
	4⅞		1120	1230	1530	2280	2810	3780	4550	4930	5600	

NOTES:

The listed capacities are based on the use of an oil of 250 S.U.V. at 100 degrees F. For other oils use the following conversion factors:

Viscosity: S.U.V. at 100 degrees F.	100	150	200	250	300	350	400	450	500	550	600
Conversion Factor	.5	.65	.85	1	1.15	1.35	1.50	1.70	1.85	2.05	2.20

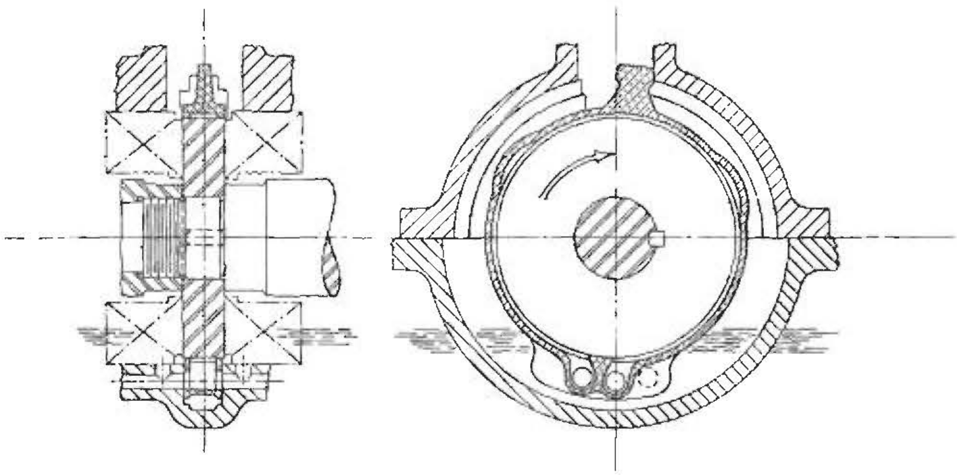


Figure 16

Part sections through thrust collar and oil circulator. Rotation here is the reverse of that shown in Figure 8 and in Figure 17 below.

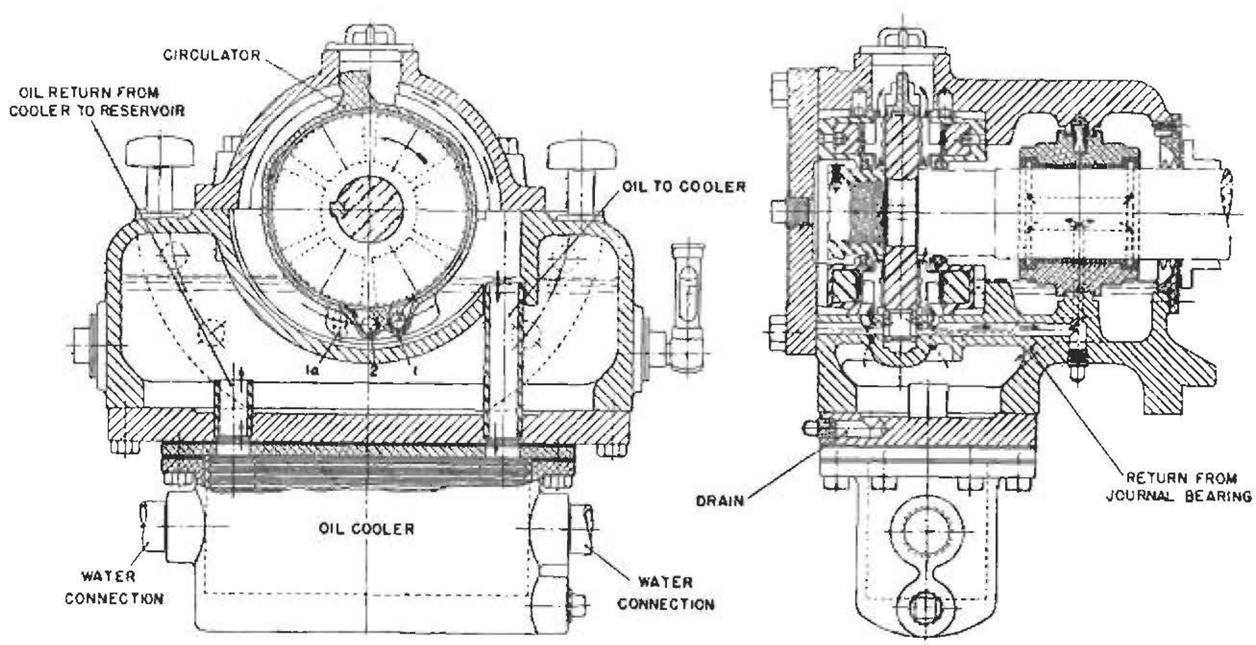
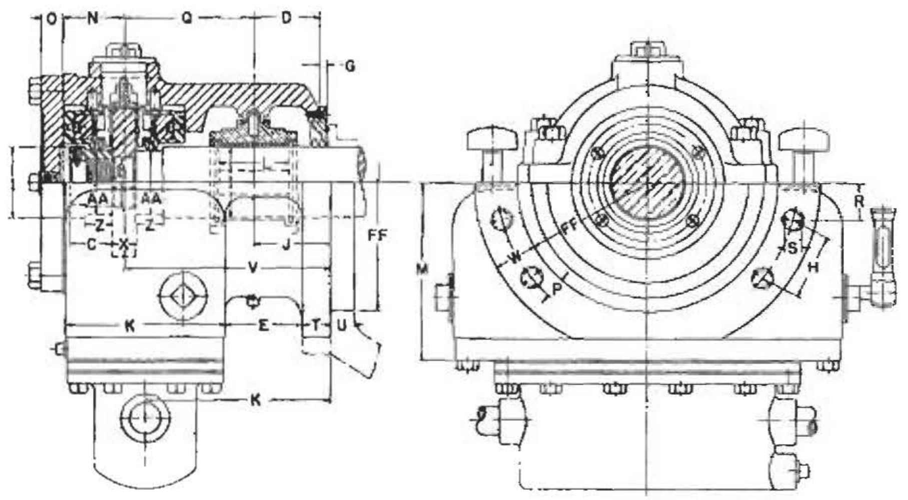


Figure 17

This is the same as Figure 8 but marked to indicate oil flow to and return from the cooler.



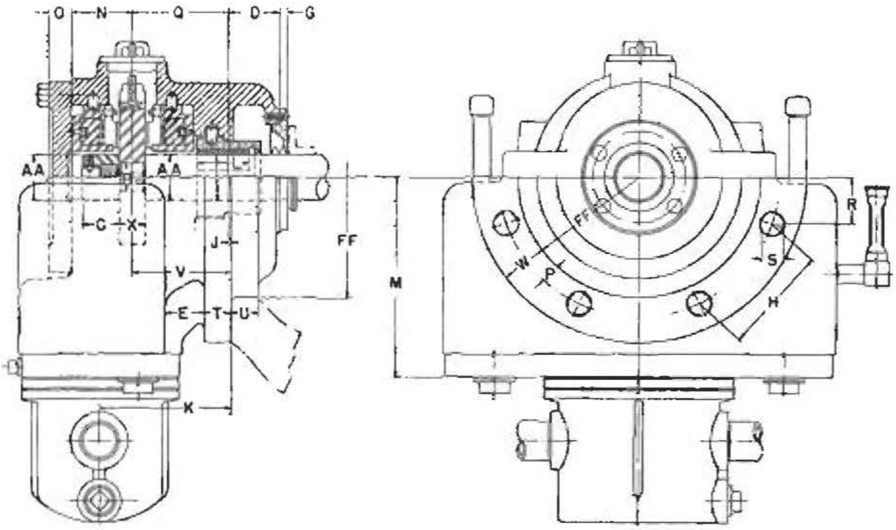
Style CH—Standard Flanges

ALL DIMENSIONS ARE IN INCHES

Caution: Before actual construction, these dimensions should be confirmed by a certified print. **TABLE IV**

Bearing Number	CH-4 "Regular"	CH-5	CH-6	CH-7	CH-8	CH-9
Weight, Brg. Complete	140	175	250	410	500	675
Collar Keyway	5/16 x 5/32	3/8 x 3/16	3/8 x 3/16	1/2 x 1/4	5/8 x 5/16	5/8 x 5/16
AA (Turn)*	1.750	2.250	2.750	3.250	3.750	4.250
B (Bore)*	1.250	1.750	2.125	2.500	3.000	3.500
C (Max.)	1 3/8	1 7/16	1 13/16	2	2 1/4	2 1/2
D	1 7/8	2 3/8	2 13/16	2 15/16	3 5/8	4 1/8
E	2 1/4	2 3/4	3	3 3/4	3 7/8	4 1/4
FF (Bore) Std.	8.250	9.000	10.750	12.500	14.250	16.000
G	1/4	1/4	1/4	1/4	1/4	1/4
H (Chord)	3 49/64	2 1/4	2 5/8	3	3 3/8	3 3/4
I (Journal Dia.*)	2.000	2.500	3.000	3.500	4.000	4.500
J	1 1/4	2 3/4	2 7/16	2 3/8	1 31/32	2 1/2
K	5 15/16	6 5/8	7 1/2	9 11/16	8 9/16	11 5/8
L	1 3/4	2 1/2	3	3 1/2	4	4 1/2
M	6 3/8	6 3/8	7 3/8	9 1/2	9 13/16	11 3/8
N	2 1/16	2 3/16	2 9/16	3	3 23/32	4 1/8
O	3/4	13/16	7/8	1	1 1/8	1 5/16
P	5/8	3/4	15/16	1 1/8	1 1/4	1 3/8
Q	3 7/8	4 5/8	5 7/16	6 1/4	7 5/8	8 1/2
R	1 1/2	1 1/4	1 1/2	1 5/8	1 7/8	2 1/8
S (Bolt Dia.)	5/8	5/8	3/4	7/8	1	1 1/8
T	13/16	1	1 1/8	1 1/4	1 3/8	1 1/2
U	5/8	7/8	1	1 1/8	1	1 1/4
V(=J+Q)	5 1/8	7 3/8	7 7/8	8 5/8	9 19/32	11
W	1 1/2	1 5/8	2	2 3/8	2 5/8	2 7/8
X	7/8	7/8	1	1 1/4	2 1/16	2 1/4
Z (Min.)	**2 3/16	1 1/16	1 1/4	1 3/8	1 9/16	1 13/16
Oil Capacity (gals.)	1.0	1.2	1.5	3.8	4.0	5.1

*In all of these, the shaft sizes may vary within limits. See Table VII, page 19. Thrust collar must be easy sliding fit on shaft.
**Shaft only, not nut (for this one size).



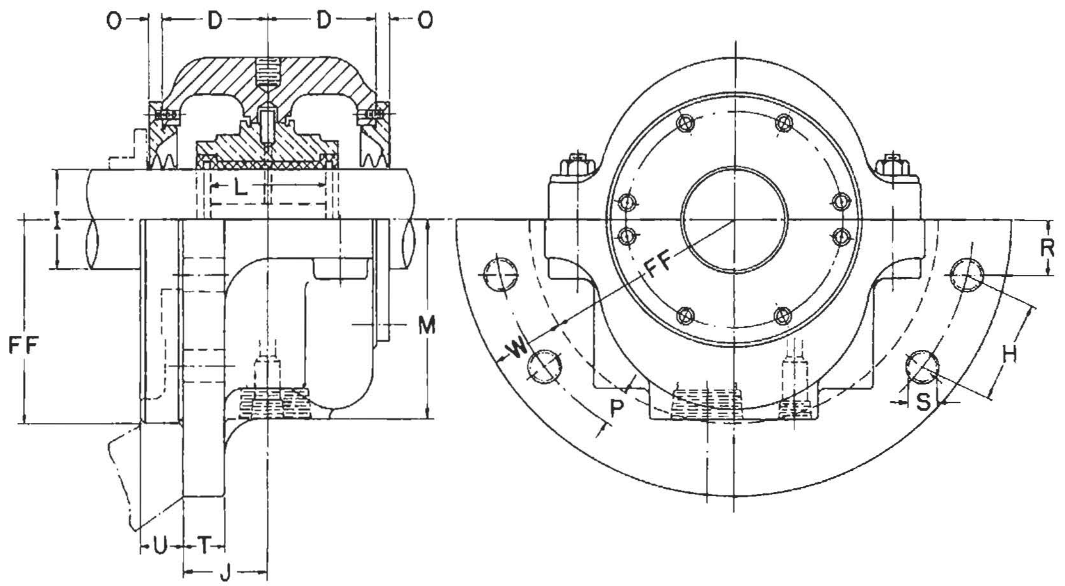
Style CHS Bearings—Special Flanges

ALL DIMENSIONS ARE IN INCHES

Caution: Before actual construction, these dimensions should be confirmed by a certified print. TABLE V

Bearing Number	CHS-4 "Short"	CHS-4 "Short"	CHS-4 "Reg."	CHS-5	CHS-5	CHS-7	CHS-7	CHS-7	CHS-8
Drawing Number	362784	362894	263402	263508	263364	363142	363404	363309	362950
Weight, Brg. Complete	140	145	150	170	190	380	415	410	500
Collar Keyway	$\frac{5}{16} \times \frac{5}{32}$	$\frac{5}{16} \times \frac{5}{32}$	$\frac{5}{16} \times \frac{5}{32}$	$\frac{3}{8} \times \frac{3}{16}$	$\frac{3}{8} \times \frac{3}{16}$	$\frac{1}{2} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{1}{4}$	$\frac{5}{8} \times \frac{5}{16}$
AA (Turn)*	1.625	1.625	1.750	2.250	2.250	3.250	3.250	3.250	3.750
B (Bore)*	1.000	1.000	1.250	1.750	1.750	2.500	2.500	2.500	3.000
C (Max.)	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{7}{16}$	$1\frac{7}{16}$	2	2	2	$2\frac{1}{4}$
D	$1\frac{11}{16}$	$1\frac{11}{16}$	$1\frac{7}{8}$	$2\frac{3}{8}$	$2\frac{3}{8}$	$2\frac{15}{16}$	$2\frac{15}{16}$	$2\frac{15}{16}$	$3\frac{11}{16}$
E	$\frac{13}{16}$	$\frac{13}{16}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{5}{16}$	$2\frac{5}{16}$	$2\frac{5}{16}$	
FF (Bore)	8.250	**10.250**	**10.250**	**10.250**	**11.500**	**11.000**	**11.000**	**11.500**	**12.750**
G	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
H (Chord)	$3\frac{49}{64}$	$5\frac{27}{64}$	3	3	3	$3\frac{11}{16}$	$3\frac{11}{16}$	$6\frac{1}{64}$	$3\frac{3}{8}$
I (Journal Dia.*)	1.500	1.500	2.000	2.500	2.500	3.500	3.500	3.500	4.000
J	$\frac{1}{16}$	$\frac{1}{16}$	$1\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$\frac{15}{16}$	$1\frac{7}{16}$	$1\frac{7}{16}$	$\frac{3}{4}$
K	$4\frac{3}{8}$	$4\frac{3}{8}$	$5\frac{15}{16}$	$6\frac{5}{8}$	$6\frac{5}{8}$	$8\frac{1}{4}$	$8\frac{3}{4}$	$8\frac{3}{4}$	$5\frac{13}{16}$
L	$1\frac{27}{32}$	$1\frac{27}{32}$	$1\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	4
M	$7\frac{1}{8}$	$7\frac{1}{8}$	$6\frac{3}{8}$	$6\frac{3}{8}$	$6\frac{3}{8}$	$9\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{5}{8}$
N	$2\frac{1}{16}$	$2\frac{1}{16}$	$2\frac{1}{16}$	$2\frac{3}{16}$	$2\frac{3}{16}$	3	3	3	$3\frac{23}{32}$
O	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$	1	1	1	$1\frac{1}{8}$
P	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{4}$	1	$2\frac{7}{16}$
Q	$3\frac{3}{16}$	$3\frac{3}{16}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$4\frac{5}{8}$	$6\frac{1}{4}$	$6\frac{1}{4}$	$6\frac{1}{4}$	$6\frac{7}{32}$
R	$1\frac{1}{2}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{7}{8}$
S (Bolt or Stud)	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	1" Tap
T	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{13}{16}$	1	1	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	
U	1	$1\frac{1}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{2}$	1	1	$1\frac{1}{4}$
V(=J+Q)	$3\frac{1}{4}$	$3\frac{1}{4}$	$5\frac{1}{8}$	$7\frac{3}{8}$	$7\frac{3}{8}$	$7\frac{3}{16}$	$7\frac{11}{16}$	$7\frac{11}{16}$	$6\frac{31}{32}$
W	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{2}$
X	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$2\frac{1}{16}$
Z (Min.)			$2\frac{5}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{9}{16}$
Oil Capacity (gals.)	1.0	1.0	1.0	1.2	1.2	3.8	3.8	3.8	4.0

*In all of these, the shaft sizes may vary within limits. See Table VII, page 19. Thrust collar must be easy sliding fit on shaft.



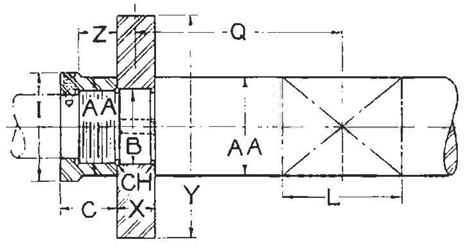
Style "C" Bearings—Standard Flanges

ALL DIMENSIONS ARE IN INCHES

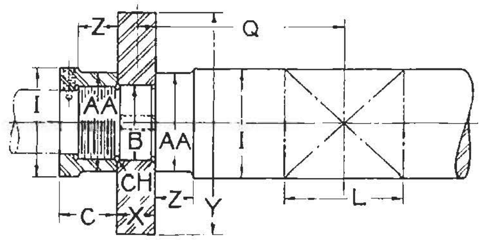
Caution: Before actual construction, these dimensions should be confirmed by a certified print. **TABLE VI**

Bearing Number	C-4	C-5	C-6	C-7	C-8	C-9
Weight, Brg. Complete	45	55	75	110	150	200
I_1 Alternative journal diameters	1.500	2.000	2.500	3.000	3.500	4.000
I_2 Alternative journal diameters	1.750	2.250	2.750	3.250	3.750	4.250
I_3 Alternative journal diameters	2.000	2.500	3.000	3.500	4.000	4.500
I_4 Alternative journal diameters	2.250	2.750	3.250	3.750	4.250	4.875
D	1 15/16	2 3/8	2 13/16	3 3/16	3 5/8	4 1/8
FF (Bore) Std.	8.250	9.000	10.750	12.500	14.250	16.000
H	3 49/64	2 1/4	2 5/8	3	3 3/8	3 3/4
J	1 7/16	1 15/16	1 3/4	1 7/8	2	2 1/4
L	1 3/4	2 1/2	3	3 1/2	4	4 1/2
M	3 3/4	4 3/8	5 3/8	6 3/8	6 3/4	7 1/2
O	1/4	1/4	1/4	1/4	1/4	1/4
P	5/8	3/4	15/16	1 1/8	1 1/4	1 3/8
R	1 1/2	1 1/4	1 1/2	1 5/8	1 7/8	2 1/8
S (Bolt Dia.)	5/8	5/8	3/4	7/8	1	1 1/8
T	13/16	1	1	1 1/8	1 1/4	1 3/8
U	5/8	7/8	15/16	1 1/8	1 1/4	1 1/4
W	1 1/2	1 5/8	2	2 3/8	2 5/8	2 7/8

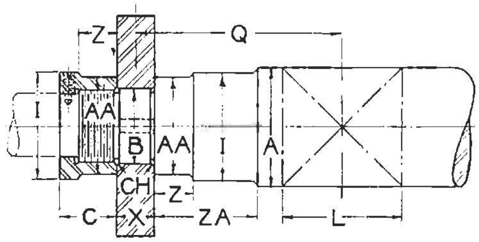
Journal diameter I usually agrees with that of journal in CH bearing, making the shells interchangeable.



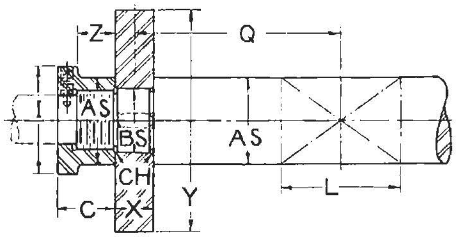
ARRANGEMENT 1



ARRANGEMENT 3



ARRANGEMENT 2



ARRANGEMENT 4

Shaft Dimension List

TABLE VII

Bearing Number		CH-4 "Short"	CH-4 "Regular"	CH-5	CH-6	CH-7	CH-8	CH-9
Journal	AS (Turn)	1.250	1.500	2.000	2.500	3.000	3.500	4.000
	AA (Turn)	1.375	1.750	2.250	2.750	3.250	3.750	4.250
	I (Turn)	1.500	2.000	2.500	3.000	3.500	4.000	4.500
	A (Turn)	1.625	2.250	2.750	3.250	3.750	4.250	4.875
	L	1 27/32	1 3/4	2 1/2	3	3 1/2	4	4 1/2
	Q	3 3/16	3 7/8	4 5/8	5 7/16	6 1/4	7 5/8	8 1/2
Thrust Collar	B (Bore)	1.000	1.250	1.750	2.125	2.500	3.000	3.500
	X	7/8	7/8	7/8	1.	1 1/4	2 1/16	2 1/4
	Y	4.125	4.125	5.125	6.125	7.125	8.125	9.125
	BS (Bore)	.875	.875	1.500	1.875	2.250	2.750	3.250
	CH (Chamfer)	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Collar Nut	C (Max.)	1 3/8	1 3/8	1 7/16	1 13/16	2	2 1/4	2 1/2
	Z (Min.)		2 3/16	1 1/16	1 1/4	1 3/8	1 9/16	1 13/16
Shaft	ZA		2 3/16	2	2 3/8	2 3/4	3 1/8	3 1/2

Spare Parts

A Kingsbury Bearing correctly chosen and installed, and properly supplied with oil, will run indefinitely without sensible wear. If failure occurs, it is usually due to lack of oil. Resultant damage is usually limited to the shoes on the loaded side, which should be sent back to us for rebabbitting. Sometimes the collar must be refinished: this may be done either by us, or in the field if our instructions are carefully followed. Hardly ever is it necessary to replace other parts. This may be contrasted with the fact that, with ball or roller bearings, the entire bearing must be replaced if failure occurs.

Accordingly, our standard proposals for spares include only one set of shoes, plus collar (if separate) for very responsible service. For journal bearings, the usual spare is a complete bearing shell. Spares for marine use are governed by the American Bureau of Shipping or other applicable regulations.

Information Required When Ordering

To make specific recommendations, we should have the fullest possible information on the conditions to be met, as follows:

(A) Style letters of the type contemplated (usually CH or C, or both)

(B) Thrust load, maximum

(C) Revolutions per minute, maximum

(D) Shaft diameters (see page 19, and send sketch of proposed arrangement)

(E) Must thrust collar be integral with shaft?

(F) Give space limitations, if any

(G) Temperature and pressure of available cooling water

(H) Journal bearing loads, if unusually heavy

(I) Special dimensions, if any, for bracket and flange

(J) Is oil to be delivered to inboard journal bearing on same shaft? If so, give journal diameter.

(K) Any other data regarding special conditions

Note for Replacements

Six-shoe base rings used in Style CH bearings are not fully interchangeable with those for Style JHJ bearings listed in other catalogs, although the thrust shoes are standard. Replacements destined for CH bearings should be specified "for Style CH," followed by the size number and the Kingsbury order number, both marked on the nameplate. Style C Journal bearing shells should be similarly identified.

Standard Guarantee

Any bearing or part furnished by us, which shall prove defective in design, material or workmanship, within one year after installation and test, will be replaced without charge f.o.b. Philadelphia, if returned to our factory. This period is, however, limited to a maximum of two years from date of shipment from the factory. No allowance will be made for labor or other expense in connection therewith unless authorized in writing by an officer of the Company.

For oil coolers and cooling coils, in accordance with usual trade practice, there is no specific guarantee period.

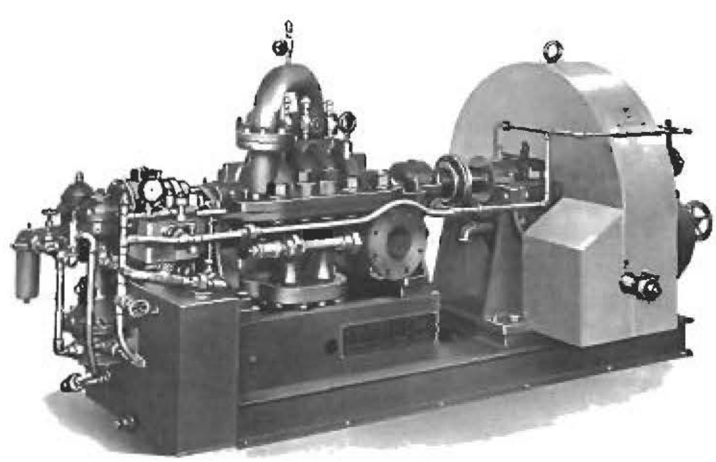


Figure 18

Photograph of 4-stage boiler feed pump with type CH thrust and journal bearing.
Courtesy Warren Steam Pump Co.

KINGSBURY